

THE TOTAL SOLAR ECLIPSE OF JULY 22, 2009

The IYA 2009 celebrates the first astronomical use of the telescope in 1609 by Galileo Galilei. The IYA 2009 vision is to convey to the people the excitement of discovery and stimulate interest especially among the young in astronomy and science under a central theme - 'The Universe, Yours to Discover'. It is just befitting that a total solar eclipse of an unusually large duration takes place this year. It shall occur on Jul 22, 2009 and the total solar eclipse will be visible across south-east Asia and western Pacific.

WHY DOES AN ECLIPSE HAPPEN?

The actual diameters of the Sun and the Moon are vastly different. Their angular diameters are very similar, the very basis of a grand spectacle these give rise to whenever the Earth, the Moon and the Sun get so aligned as to cause an eclipse of the Sun by the Moon. The orbits do not lie in a plane, that of the Moon inclined by a bit over 5deg to the Earth's, a solar eclipse does not take place on every New Moon day. In a Century, there are a total of 238 solar eclipses. The maximum number of solar eclipses in a year is five whereas minimum number is two.

WILL THE TOTAL ECLIPSE BE VISIBLE FROM INDIA?

The path of totality of the eclipse of Jul 22, 2009 starts out from the Gujarat coast, passing over northern India, northern Bangla Desh, eastern Nepal, Bhutan, northern tip of Myanmar, central China and the Pacific Ocean. The partial eclipse will be visible from a much wider region, as also from all over India. Major Indian cities the path of totality passes over are Bhavnagar, Surat, Ujjain, Indore, Bhopal, Sagar, Jabalpur, Varanasi, Allahabad (grazing), Gaya, Patna, Bhagalpur, Jalpaigudi, Guwahati and Dibrugarh etc. Local circumstances for the total eclipse in some Indian cities in the path of totality are given below:

City	Second contact IST	Third contact IST	Sun Altitude
Surat	06h 21m	06h 24m	02 deg
Bhopal	06 22	06 25	07 deg
Patna	06 25	06 28	15 deg
Jalpaigudi	06 26	06 30	19 deg

AT BANGALORE?

At Bangalore the Jul 22, 2009 solar eclipse is partial, with a 0.72 magnitude. Maximum eclipse is at 6:20:20 IST, the Sun's altitude being only 3.1 deg.

AN ECLIPSE WITH THE LONGEST TOTALITY DURATION IN THE 21st CENTURY

The eclipse of Jul 22, 2009 has the longest total phase in a solar eclipse in the 21st Century: in fact the totality is of longest duration in any solar eclipse between 1991 and 2132. The next eclipse that will surpass it in duration is due on June 13,

Prof R C Kapoor
Indian Institute of Astrophysics

2132 only. It is thus of great interest that the Jul 22 eclipse offers a totality lasting several minutes all along the path, lasting for up to 6 min 39 sec in the ocean about 100 km south of the Bonin Islands, southeast of Japan. The eclipse magnitude (the fraction of the Sun's diameter obscured by the Moon) is quite large at 1.0799. The maximum theoretical duration for a total solar eclipse is 7 min 31 sec. The maximum width of the path of totality is about 250 km. The closer one is to the centre line of the path of totality the longer is the duration of totality.

EXPERIMENTS PLANNED BY IIA FOR THE SOLAR ECLIPSE

In an eclipse we get a rare chance to observe the solar corona when the intense light of the photosphere, the visible surface of the Sun which is one million times brighter than the corona, is blocked out for a short while by the Moon. The surface of the Sun is fiery hot at about 5500 deg C. However, the corona is an atmosphere of hot ionized gas at 2 million degrees, visible up to several solar radii during totality. IIA's aim is to study the existence of waves in the solar corona and their nature and shed light on why the corona is so hot. In India, the totality phase is close to the Sunrise time. The Monsoon clouds pose another problem. So, IIA is heading east: to observe the eclipse from its camp at Anji, a small hilly area near Hangzhou in China where the chances of viewing the eclipse from Indian parts are about 60 percent.

VIEWING THE ECLIPSED SUN

Do not look at the Sun directly ever, more so during a solar eclipse. The only safe time is when the eclipse is total and that happens between the second and third contact. This is also the right moment to watch the eclipsed Sun directly, or study with proper equipment.

THE TRIPLE ECLIPSES OF JULY AND AUGUST 2009

This year we are witnessing three eclipses in a row. However, there is nothing to be scared about. The orbits and positions of the Moon and the Earth can make it happen. In fact two consecutive eclipses in a year are more common. The last time triple eclipses took place was in the year 2000. This year the triplet occurs as follows:

1. Penumbral lunar eclipse on Jul 7, 2009 - Not visible from India.
2. Total solar eclipse on Jul 22, 2009 - Visible from India
3. Penumbral lunar eclipse on Aug 6-7, 2009 - Visible from India, at Moonset time early morning on the 7th.